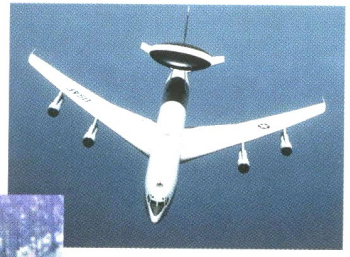
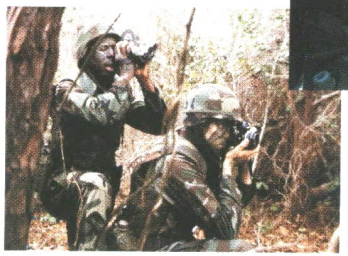




Net-Centricity & Net Ready
It's More than Information/Data Interoperability

Jack Zavin
Chief, Information Interoper
DoD CIO/A&I Directorate
(703) 607-0238, FAX (703) 6
Jack.Zavin@osd.mil

ASD(NII)/DoD CIO Vision

Power to the Edge

People throughout the trusted, dependable and ubiquitous net are empowered by their ability to access information and recognized for the inputs they provide.

Three goals:

- **Build the net**
- **Populate it**
- **Protect it**

The Campaign for Achieving Information Interoperability

Nexus – The (Multinational) Joint Task Force Operations

Process es

Organizati ons

Verificatio n

Integrated Architectures & Standards

Fundin g

Balanced & Synchronized

e Organization Training Materiel Leadership Personnel Fa

olution Sets Across the life cycle from "new" to "fielde

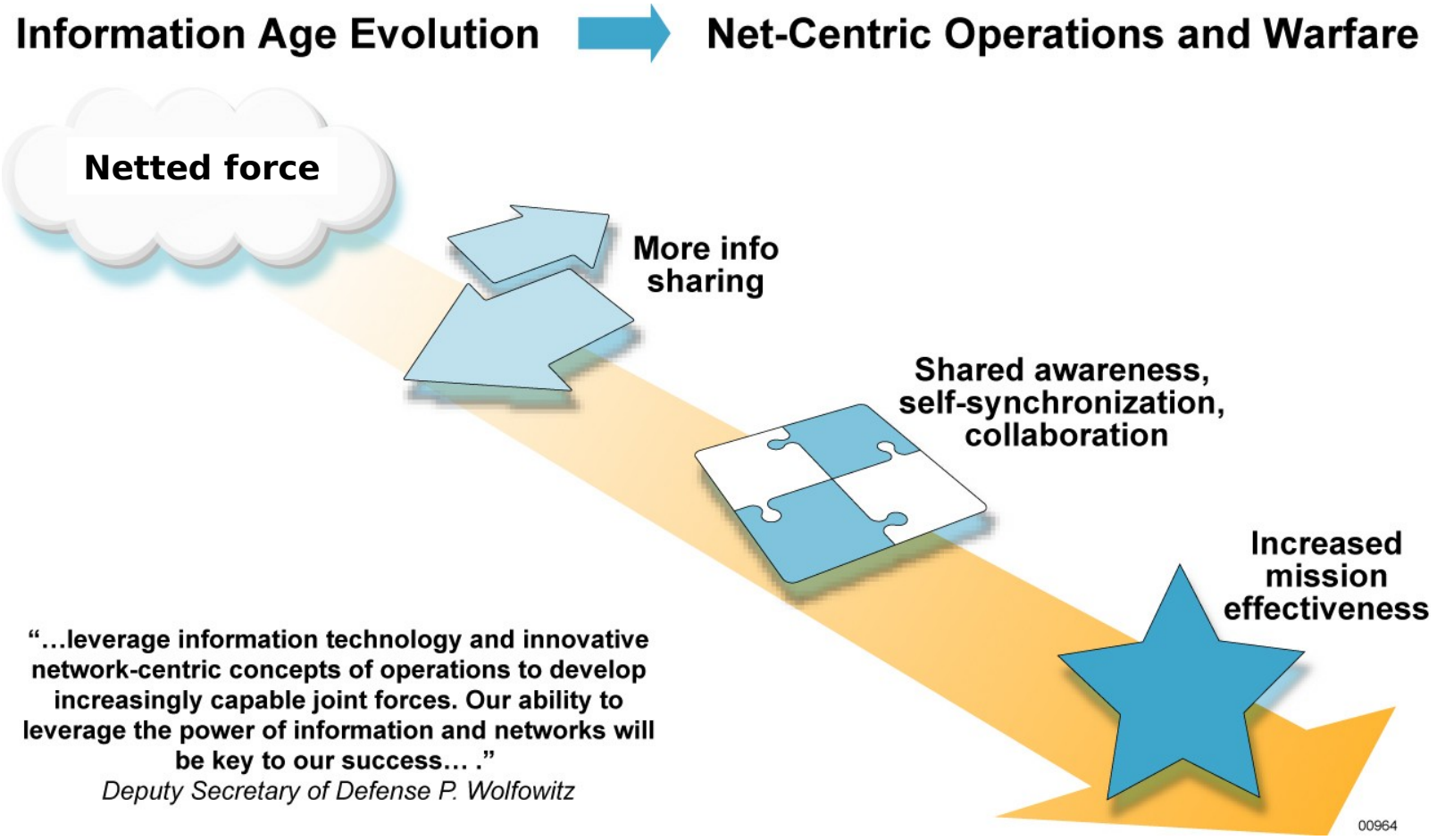
DoDD 4630.5 & DoDI 4630.8

etwork-Centric or Net-Centric?

- **Network implies infrastructure**
- **Net-centric supports non-linear relationships and increased tempo of operations**

Net-Centric Operations & Warfare
A Transformation Enabler

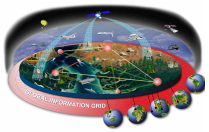
Net-Centricity **is a transformation enabler that empowers all users with the ability to easily discover, access, integrate, correlate and fuse data/information that support their mission objectives.**



"…leverage information technology and innovative network-centric concepts of operations to develop increasingly capable joint forces. Our ability to leverage the power of information and networks will be key to our success… ."

Deputy Secretary of Defense P. Wolfowitz

Future Directions For Defense



Power to the Edge

1. Make information available on a net that people depend on and trust

2. Populate the net with new, dynamic sources of information to defeat the enemy

3. Deny the enemy advantages and exploit weaknesses

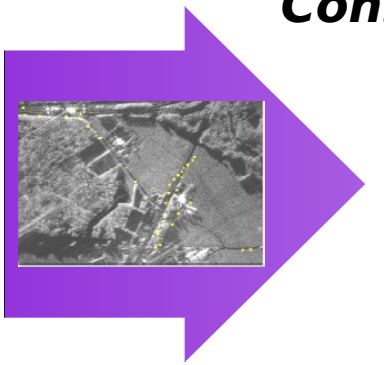
Department of Defense Transformation Planning Guidance

April, 2003

"Services will explicitly identify initiatives to improve … adoption of "post before process" intelligence and information concepts, achievement of data level Interoperability; and deployment of "net-ready" nodes of platforms, weapons and forces.

From
Supplier Dominates

Task
Process
Exploit
Disseminate



To
Consumer Dominates

Task
Post
Process
Use

Net-Centric Data Strategy
Defining the Problem

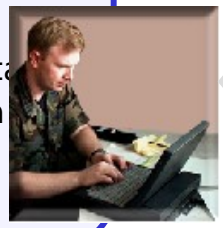
End-User Consumer

"What data exists?"

"How do I access the data"

"How do I know this data what I need?"

"How can I tell someone what data I need?"

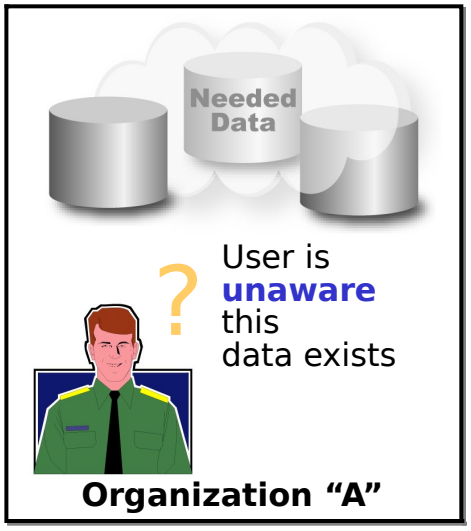


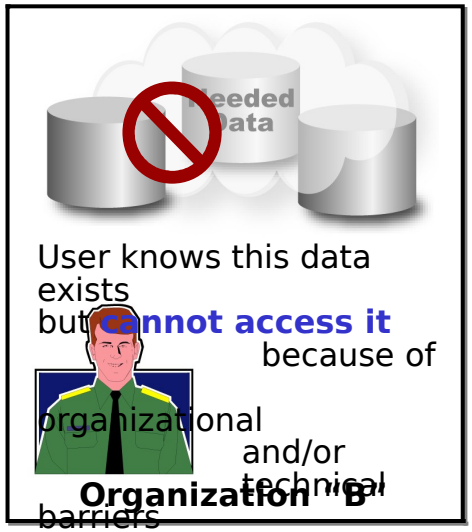
End-User Producer

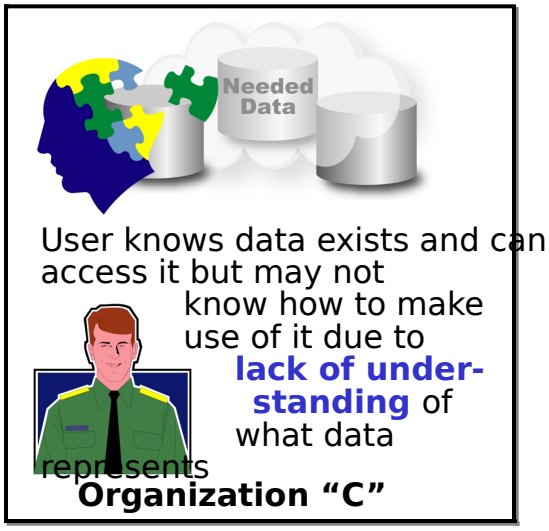
"How do I share my data with others?"

"How do I describe my data so others can understand it?"

BARRIER BARRIER **BARRIER** BARRIER




Needed Data
User knows this data exists but cannot access it because of organizational and/or technical barriers
Organization "B"


Needed Data
User knows data exists and can access it but may not know how to make use of it due to lack of understanding of what data represents
Organization "C"

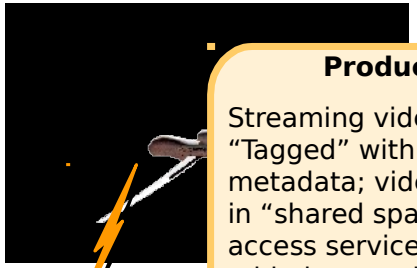
DoD's Net-Centric Data Strategy

- **The Net-Centric Data Strategy (signed May 9, 2003) is a key enabler of the Department's transformation:**
- **The Strategy provides the foundation for managing the Department's data in a net-centric environment, including:**
  - ✓ **Ensuring data are visible, accessible, and understandable when needed and where needed to accelerate decision making**
  - ✓ **"Tagging" of all data (intelligence, non-intelligence, raw, and processed) with metadata to enable discovery by known and unanticipated users in the Enterprise**
  - ✓ **Posting of all data to shared spaces for users to access except when limited by security, policy, or regulations**
  - ✓ **Organizing around Communities of Interest (COIs) that are supported by Warfighter,**

Net-Centric Data CONOPS

Consumer

Automated search of sources using discovery metadata. Pull data of interest. Using registered format, definitions, and core services, translate into needed structure.



Producer

Streaming video available. "Tagged" with discovery metadata; video available in "shared space" via data access service. Metadata added to catalog.

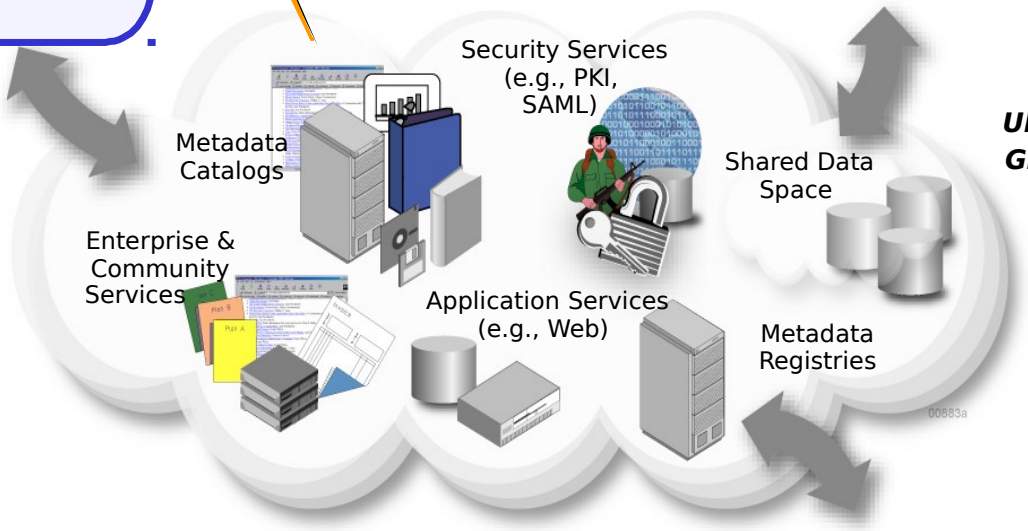
Producers of data make their data **visible** by advertising their data in catalogs

Producers ensure data is **accessible** by posting data to a secure, shared storage space

Consumers of data search catalogs to discovery what data assets are **visible**

Data is **accessed** from shared storage space

Consumer **understands** what the data is because its context and structure are described



Ubiquitous Global Nets

The structure and semantics of certain data assets are provided by developers increasing the ability to **understand** and use the data asset

Developer

Understands the data format to build applications that post, process, exchange, and display information.

Integrated Architecture "(One Architecture - 3 Views)

with Related Sources & Documents

JOINT OPERATIONS, OPERATING, FUNCTIONAL & INTEGRATING CONCEPTs

"AS Programmed" & "TO BE(s)"

*** Functional Area & Organizational**

All View

The Operational View **describes and interrelates the operational elements, tasks and activities, and information flows required to accomplish mission operations.**

The Systems View **describes and interrelates the existing or postulated technologies, systems, and other resources intended to support the operational view.**

The Technical View **describes the profile of rules, standards, and conventions governing systems implementation.**

- **Information Format & Content**
- **Information Transfer**
- **Information Processing**
- **Information Security**
- **User Interface**

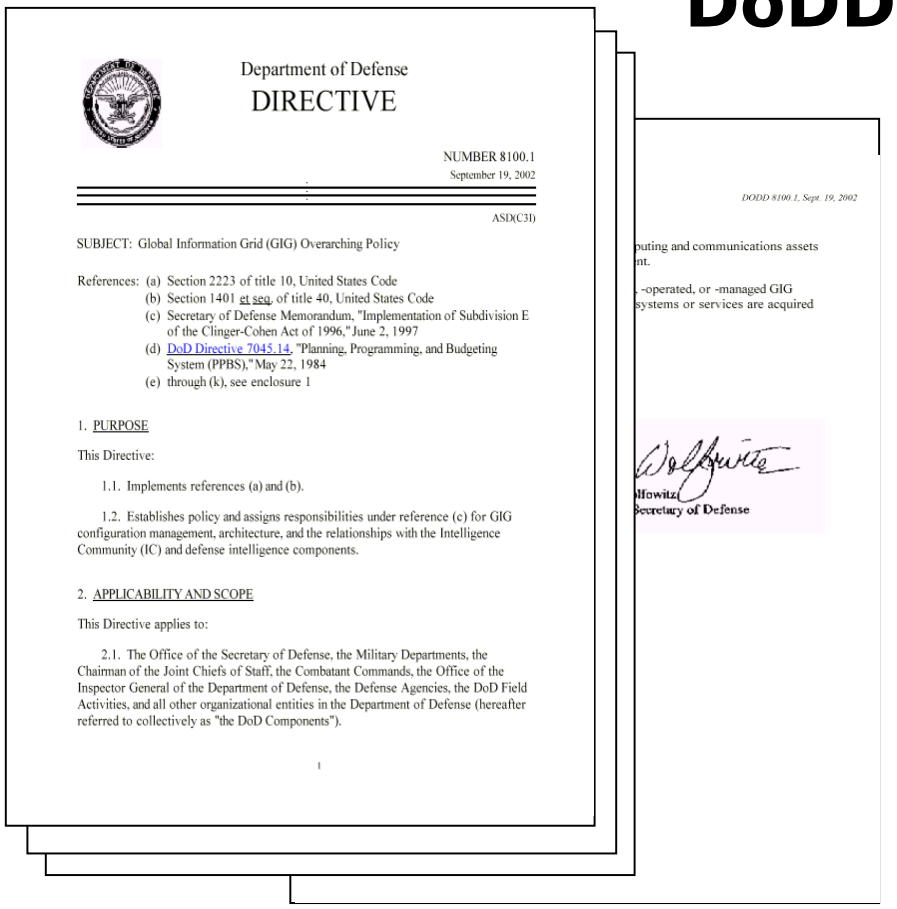
DOT_LP_ Documents (e.g. JTB Doctrine)

DoD IT Standards Registry (JTA +)

The Bottom line keep this equation balanced:OV = SV + Non-

The Global Information Grid

DoDD 8100



Department of Defense

DIRECTIVE

NUMBER 8100.1

September 19, 2002

ASD(C3I)

SUBJECT: Global Information Grid (GIG) Overarching Policy

References: (a) Section 2223 of title 10, United States Code
(b) Section 1401 et seq. of title 40, United States Code
(c) Secretary of Defense Memorandum, "Implementation of Subdivision E of the Clinger-Cohen Act of 1996," June 2, 1997
(d) DoD Directive 7045.14, "Planning, Programming, and Budgeting System (PPBS)," May 22, 1984
(e) through (k), see enclosure 1

1. PURPOSE

This Directive:

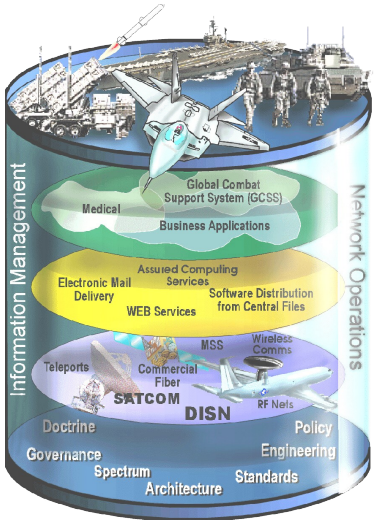
1.1. Implements references (a) and (b).

1.2. Establishes policy and assigns responsibilities under reference (c) for GIG configuration management, architecture, and the relationships with the Intelligence Community (IC) and defense intelligence components.

2. APPLICABILITY AND SCOPE

This Directive applies to:

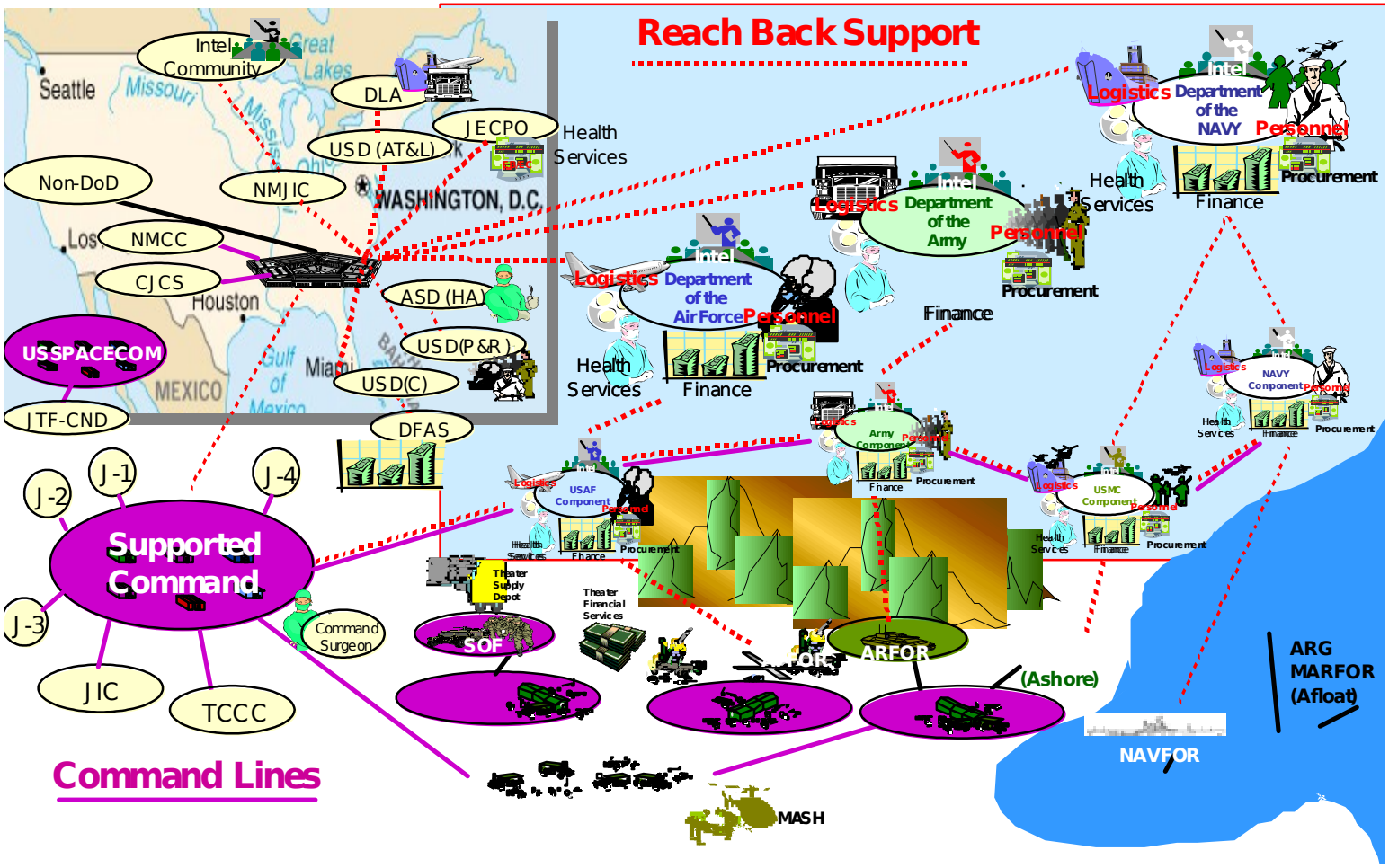
2.1. The Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities in the Department of Defense (hereafter referred to collectively as "the DoD Components").



The GIG supports all Department of Defense,
National Security and related Intelligence Community missions and functions in war and in peace.

The GIG encompasses the globally interconnected, end-to end set of information capabilities, associated processes and personnel for collecting, posting, distributing and managing information on demand by warfighters,
policy makers and support personnel.

GIG Has A JTF Focus

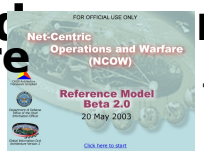


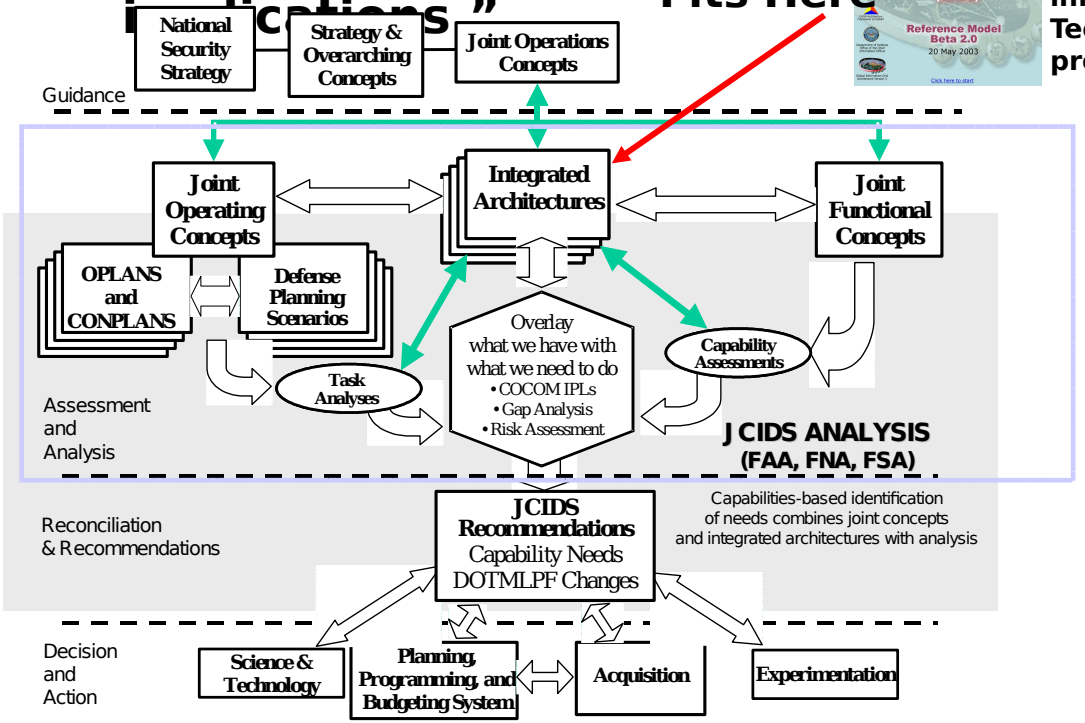
Joint Capabilities Integration & Development And The GIG Architecture

CJCSI 3170.01C

"As they are developed, the integrated architectures will provide the construct for analysis to identify capability shortfalls, compare alternatives for improving joint warfighting capabilities, and associated resource implications."

The GIG Architecture represents information use and Information Technology in the capabilities process





Where we are moving to: The Net-Ready KPP

Net-Ready Key Performance Parameter (NR-KPP). The **NR-KPP assesses information needs, information timeliness, information assurance, and net-enabled attributes** required for information exchange and use. The NR-KPP consists of measurable and testable characteristics and/or performance metrics required for the timely, accurate, and complete exchange and use of information to satisfy information needs for a given capability. The NR-KPP is comprised of the following elements:

- Compliance with the Net-Centric Operations and Warfare (NCOW) Reference Model (RM)
- Compliance with applicable Global Information Grid (GIG) Key Interface Profiles (KIPs)
- Verification of compliance with DoD information assurance requirements
- Supporting integrated architecture products required

Required KPP Attributes

Information needs …

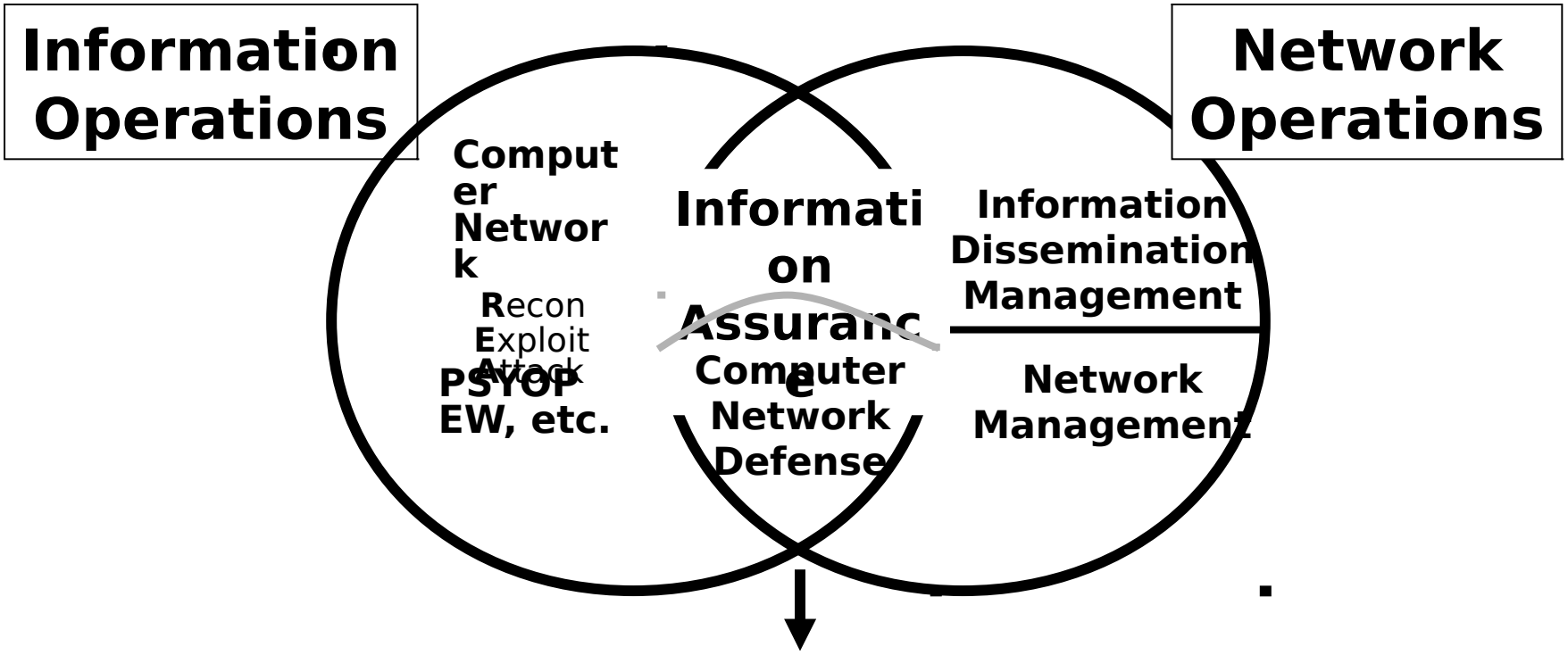
Information timeliness …

Information assurance …

Net-enabled …

- ☑ **Information Needs: A condition or situation requiring knowledge or intelligence derived from received, stored, or processed facts and data.**
- ☑ **Information Timeliness: Occurring at a suitable or appropriate time for a particular condition or situation.**
- ☑ **Information Assurance: Information operations that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation.**
- ☑ **Net-Enabled: The continuous ability to interface and interoperate to achieve operationally secure exchanges of information in conformance with enterprise constraints.**

Organizing Construct for IA

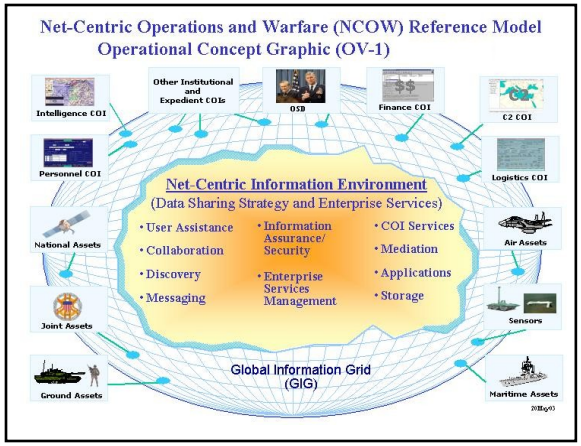


INFORMATION ASSURANCE:

Information Operations that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation.

NCOW Reference Model V 1.0

Content



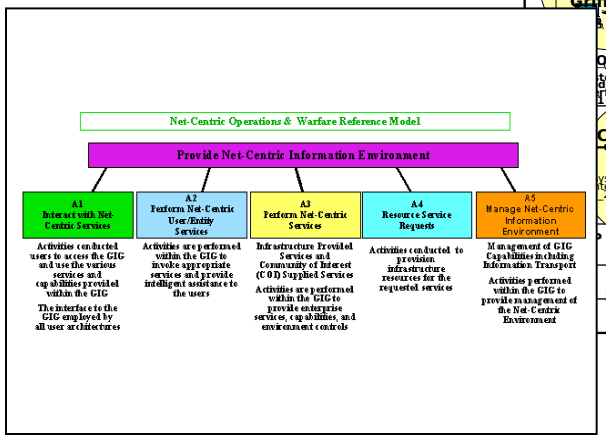
Net-Centric Information Environment

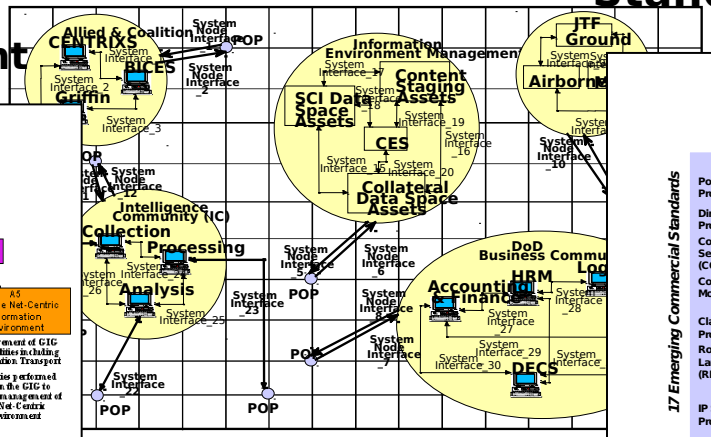
- **Overview & Summary (AV-1)**
- **Integrated Dictionary (AV-2)**
- **Activity Model Node Tree (OV-5)**
- **Systems View (SV-1, SV-2)**
- **Standards Forecast (TV-2)**

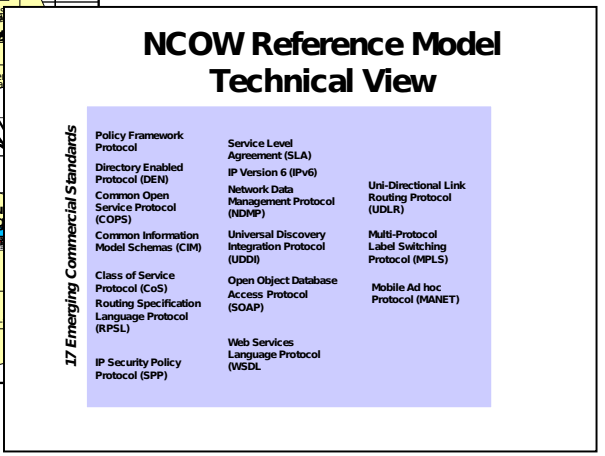
Net-Centric Systems Interfaces Description

Net-Centric Standards Profile

Provide Net-Centric Information Environment


Net-Centric Operations & Warfare Reference Model
Provide Net-Centric Information Environment
A1 Interact with Net-Centric Services
A2 Perform Net-Centric User/Entity Services
A3 Perform Net-Centric Services
A4 Resource Service Requests
A5 Manage Net-Centric Information Environment

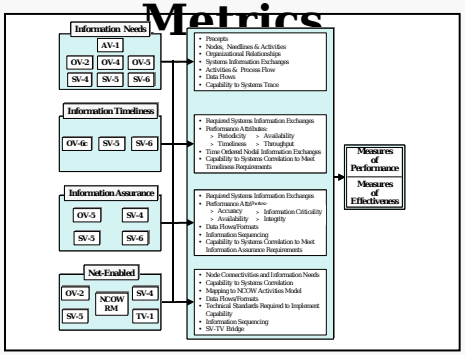



NCOW Reference Model
Technical View
17 Emerging Commercial Standards
Policy Framework Protocol
Directory Enabled Protocol (DEN)
Common Open Service Protocol (COPS)
Common Information Model Schemas (CIM)
Class of Service Protocol (CoS)
Routing Specification Language Protocol (RPSL)
IP Security Policy Protocol (SPP)
Service Level Agreement (SLA)
IP Version 6 (IPv6)
Network Data Management Protocol (NDMP)
Universal Discovery Integration Protocol (UDDI)
Open Object Database Access Protocol (SOAP)
Web Services Language Protocol (WSDL
Uni-Directional Link Routing Protocol (UDLR)
Multi-Protocol Label Switching Protocol (MPLS)
Mobile Ad hoc Protocol (MANET)

First Description of net-centricity at the enterprise

Net-Ready KPP Synthesis & Verification

Supporting Architecture Metrics

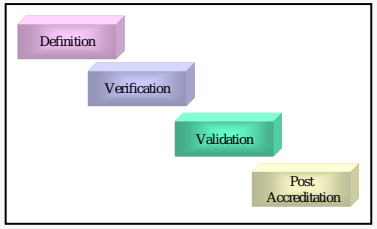


- Inspection
- Analysis
- Test

NCOW RM Compliance

- Inspection
- Analysis

IA Compliance



- Inspection

Applicable KIP Compliance

	Communications KIPs
1.	Logical Networks to DISN Transport Backbone
2.	Space to Terrestrial Interface
3.	JTF to Coalition
4.	JTF Component to JTF Headquarters
5.	Teleport (i.e., deployed interface to DISN)
6.	Joint Interconnection Service
7.	DISN Service Delivery Node
8.	Secure Enclave Service Delivery Node (e.g., SCI/Collateral KIP)
	Computing KIPs
9.	Application Server to Database Server
10.	Client to Server
11.	Applications to COE/CCP
	Network Operations KIPs
12.	End System to PKI
13.	Management Systems to (integrated) Management Systems
14.	Management Systems to Managed Systems
15.	IDM to Distribution Infrastructure
16.	Information Servers to IDM Infrastructure
	Applications
17.	Application Server to Shared Data - FICP (SADI)

- Inspection
- Test

Measurable and Testable Net-Ready KPP

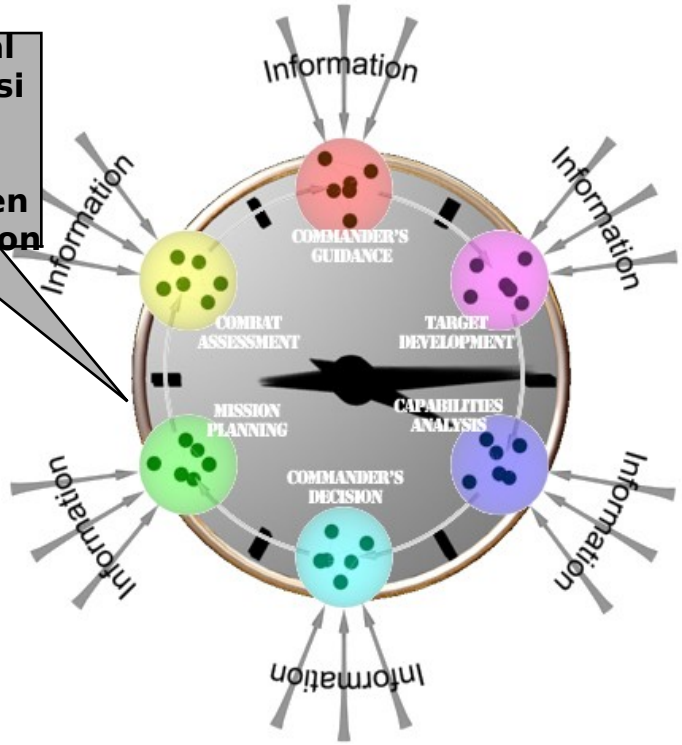
Observations*

- **Network Management**
  - Network planning only at brigade level, not division.
  - Primarily used for situational awareness.
- **Meteorological Support**
  - Not used. SIPRNET and USAF weather sensors used instead.
- **Topographic Support**
  - Provides decision makers with the products required.
  - Operators cited difficulties in operating, transporting and maintaining the system.

* Briefing on ABCS in OEF/OIF, Dr. Hutchison, DOT&E, NDIA Interope

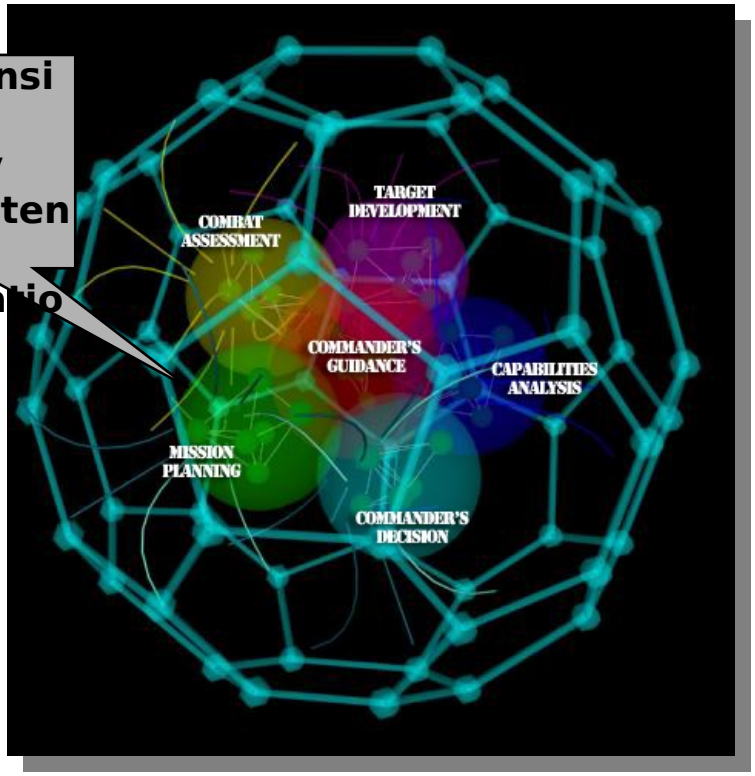
The Joint Targeting Cycle in a Net Centric Environment

- Sequential
- Unresponsive
- Untimely
- Inconsistent Information



"As Is"

- Concurrent
- Responsive
- Timely
- Consistent Information



"To Be"

The Confusion Factor

Joint Mission Areas

CM-1014-00, Joint Mission Areas to Organize the Joint Operational Architecture, 6 September 2000

As Is
- Deployment/Redeployment
- Movement and Maneuver
- Strategic Deterrence
- Overseas Presence and Force Protection
- Special Operations
- Joint C2
- Focused Logistics
- Multinational Ops and Interagency Coordination
- Employ Fires
- Information Operations
- Force Protection
- MOOTW
- ISR
- Communications/Computer Environment

To Be
- Deployment/Redeployment
- Dominant Maneuver
- Strategic Deterrence
- Overseas Presence and Force Protection
- Special Operations
- Joint C2
- Focused Logistics
- Multinational Operations and Interagency Coordination
- Precision Engagement
- Information Superiority
- Full Dimensional Protection

Missions or Mission

- Close Air Support
- Combat Search and Rescue
- Theater Air and Missile Defense
- Suppression of Enemy Air

Levels of Warfare

- Strategic
- Operational
- Tactical

Organizational Structure

- Joint Task Force
- JTF Standing Headquarters
- COCOM
- Military Service

Others

- Enterprise
- Community of Interest
- Porfolios

Joint Operations Capability
Joint Functional Capabilities
(NC,C2,FA,FP,FL)
Joint Operating Capabilities
Joint Integrating Capabilities

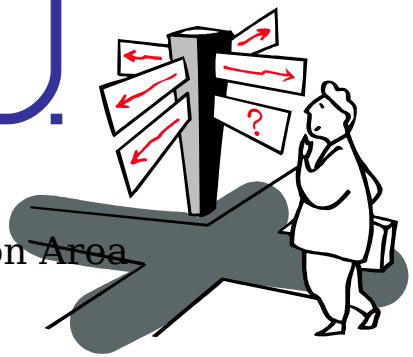
BMMP Domains

- Acquisition/Procurement
- Finance Accounting Operations & Financial Management
- Human Resource Management
- Strategic, Planning, & Budgeting
- Installations & Environment

Functional

- SIGINT
- MASINT
- Fire Support
- Personnel
- Logistics

Enterprise Information Environment Mission Area



Empowering Known and Unanticipated Users

Shift Power to the User:

- Bring data consumers, producers, and system developers closer together through Communities Of Interest
- Guide data management activities through user-driven metrics, user ratings/feedback, and data sharing incentives
- Provide the infrastructure and services (e.g., GIG B/E, NCES, Shared Spaces, Catalogs) to permit the user to find and retrieve data

Producer and Developer

Make Data Accessible to and Usable by Known and Unanticipated Users

Consumer

Backup Slides

NET CENTRIC ATTRIBUTES

Title	Description	Metric	Source
Internet Protocol (IP)	Data packets routed across network, not switched via dedicated circuits	**IP as the Convergence Layer** Net-Centric Operations and Warfare Reference Model (NCOW RM), Technical View compliant with Joint Technical Architecture (JTA)	NCOW RM, GIG Arch v2, IPv6 Memos (9 Jun 03 and 29 Sep 03), JTA Memo, Nov 24, '03 JTA v6.0
Secure and available communications	Encrypted initially for core network; goal is edge-to-edge encryption and hardened against denial of service	**Black Transport Layer** Transformational Communications Architecture (TCA) compliance; Technical View compliant with JTA	TCA; IA Component of Assured GIG Architecture; JTA Memo, Nov 24, '03 JTA v6.0
Only handle information once (OHIO)	Data posted by authoritative sources and visible, available, usable to accelerate decision making	**Reuse of existing data repositories**	Community of interest policy (TBD)
Post in parallel	Business process owners make their data available on the net as soon as it is created	**Data tagged and posted before processing** NCOW RM Technical View compliant with JTA	NCOW RM, DoD Net-Centric Data Strategy (May 9, '03) JTA Memo, Nov 24, '03 JTA v6.0
Smart pull (vice smart push)	Applications encourage discovery; users can pull data directly from the net or use value-added discovery services	**Data stored in public space is advertised (tagged) for discovery** NCOW RM, Technical View compliant with JTA	NCOW RM; DoD Net-Centric Data Strategy (May 9, '03); JTA Memo Nov 23, '03 JTA v6.0
Data centric	Data separate from applications; apps talk to each other by posting data	**Metadata registered in DoD Metadata Registry** NCOW RM, Technical View compliant with JTA	NCOW RM; DoD Net-Centric Data Strategy (9 May 03); JTA Memo, Nov 24, '03 JTA v6.0
Application diversity	Users can pull multiple apps to access same data or choose same app (e.g., for collaboration)	**Apps posted to net and tagged for discovery** NCOW RM, Technical View compliant with JTA	NCOW RM; JTA Memo, Nov 24, '03 JTA v6.0
Assured Sharing	Trusted accessibility to net resources (data, services, apps, people, collaborative environment, etc.)	**Access assured for authorized users; denied for unauthorized users**	Security/IA policy Nov 21, '03); IA Component of Assured GIG Architecture; JTA Memo, Nov 24, '03 JTA v6.0
Quality of service	Data timeliness, accuracy, completeness, integrity, and ease of use	**Net-ready key performance parameter**	Service level agreements (TBD); JTA Memo, Nov 24, '03 JTA v6.0

A work in process

Architecture Products Required to Assess Information Exchange and Use

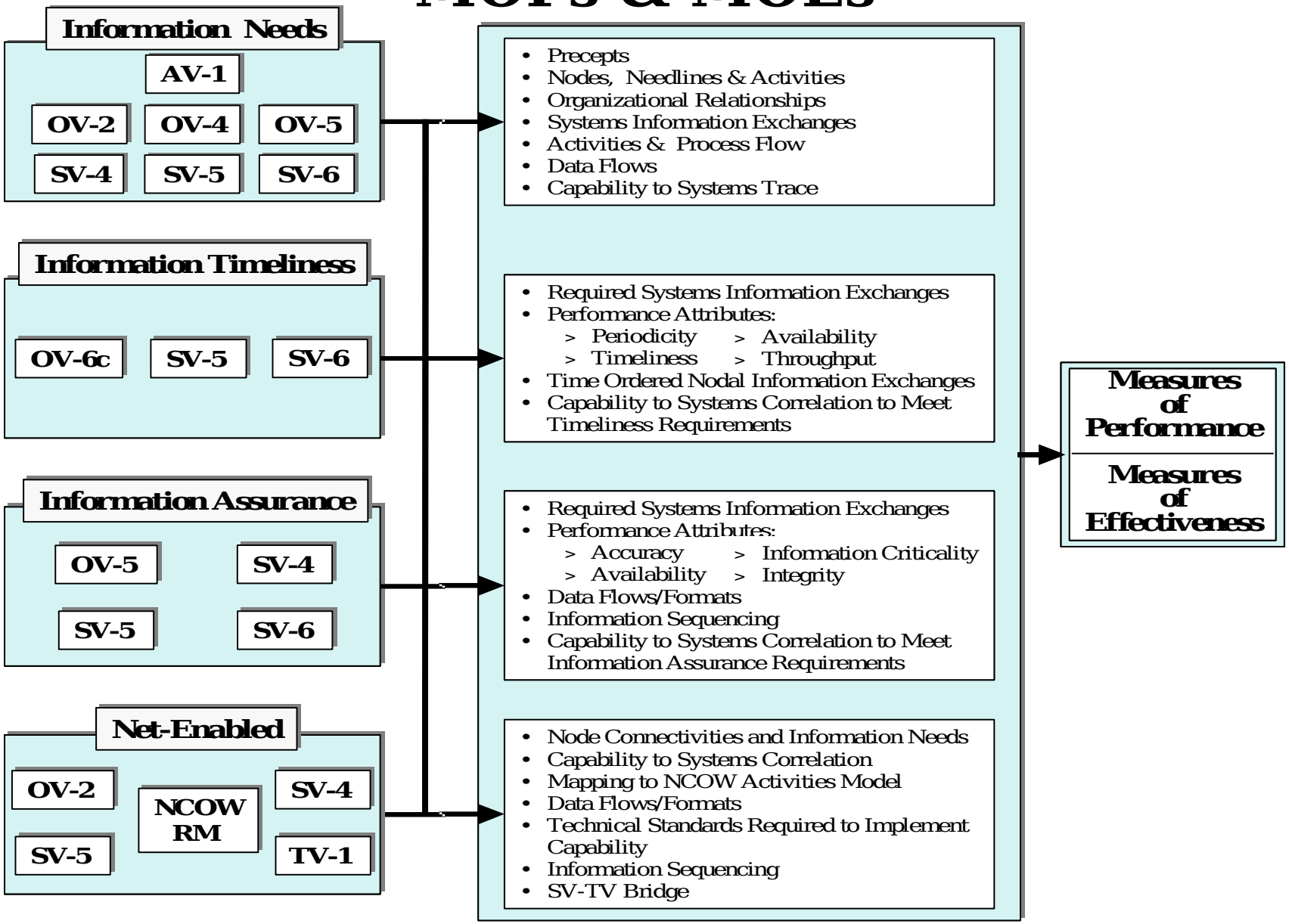
Information needs … (AV-1, OV-2, OV-4, OV-5, SV-4, SV-5, SV-6)

Information timeliness … (OV-6c, SV-5, SV-6)

Information assurance … (OV-5, SV-4, SV-5, SV-6)

Framework Product	Framework Product Name	General Description
AV-1	Overview and Summary Information	Scope, purpose, intended users, environment depicted, analytical findings
OV-2	Operational Node Connectivity Description	Operational nodes, operational activities performed at each node, connectivity and information exchange needlines between nodes
OV-4	Organizational Relationships Chart	Organizational, role, or other relationships among organizations
OV-5	Operational Activity Model	Operational Activities, relationships among activities, inputs and outputs. Overlays can show cost, performing nodes, or other pertinent information.
OV-6c	Operational Event-Trace Description	One of three products used to describe operational activity sequence and timing - traces actions in a scenario or sequence of events and specifies timing of events
SV-4	Systems Functionality Description	Functions performed by systems and the information flow among system functions
SV-5	Operational Activity to Systems Function Traceability Matrix	Mapping of systems back to operational capabilities or of system functions back to operational activities
SV-6	Systems Data	Provides details of systems data being exchanged between

Integrated Architecture Products Support MOPs & MOEs



Interoperability

" The ability of systems, units or forces to provide servic
to and accept services from other systems, units or forc
and use the services to enable them to operate effectiv
together."

Joint Publication 1-02
(emphasis added)

... the right information
... at the right time
... in the right format
... to the right "warfighter"

teroperability is more than just information exchange
it impacts systems, process, procedures,
organizations and missions over the life cycle;
and it must be balanced with Information Assurance